Space Weather Forecast

Issued on Sunday, 13 March 2022 at 00:27 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/Minor geomagnetic storms likely with a Chance of G2/Moderate storm on Days 1 and 2 (13-14 Mar). Reducing Chance of further Moderate-Class flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours, with some low level Common-class flares observed. These originated mostly from a large region in the northeast and an area without spots in the northwest which gave a long period Common-class flare on 10 March and a large full halo Coronal Mass Ejection (CME), which is Earth directed.
There are currently four sunspot regions on the visible disc, including the large and most magnetically complex region in the northeast. There are also two other reasonably large groups, one of which is the source of a Moderate-class flare late on 11 March. The remaining sunspot on the disc is small and weak.

Solar Wind / Geomagnetic Activity: The solar wind showed waning CME effects early in the period. The wind speed was at background or slightly elevated levels, varying between 380-420 km/s. The Interplanetary Magnetic Field was Moderate to start, but soon eased to weak levels. The north-south component was moderately south directed early in the period, but is now varying weakly in a mainly southward direction. Geomagnetic activity started at G1/Minor Storm (Kp 5) levels, but has since eased to mainly Quiet (Kp1-2).

Energetic Particles / Solar Radiation: No solar radiation storms were observed, with energetic particles returning to background levels after a slight rise in response to a flare on 10 March.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be mainly Low, perhaps Moderate, with a chance of Moderate-class flares. The risk of Moderate-class flares mainly comes from the regions in the southwest and northeast, with the risk reducing slightly through Days 2 and 3 (14-15 Mar) as the southwestern region rotates off the disc.

Solar Wind / Geomagnetic Activity: There are two potentially Earth-directed CMEs in the forecast. The first is from a filament lift off on 09 March. A marginal influence is possible at Earth either late 13th March or more likely through 14th March. The second is a large full halo CME emitted on the 10th March, and is also expected to arrive either late on 13th March or early on 14th March. Meanwhile, a coronal hole may also bring faster winds during Day 1 (13 Mar). Any fast wind from this feature is likely to be masked by the large CME.
Geomagnetic activity is expected to be mostly Quiet to start. Activity is likely to increase with the CME arrival(s), becoming Unsettled to G1/Minor Storm (Kp 5), with a Chance of a G2/Moderate Storm (Kp 6). Geomagnetic activity will then gradually return to largely Quiet to Unsettled levels during Days 3 and 4.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with energetic particles expected to remain predominantly at Background levels, albeit with a very slight chance of rising above the S1 level.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	70	70	20	1
Strong	G3	No	5	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	25	20	20
Very Active	R3 to R5 X	No	2	2	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	3	3	3	3
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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